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THE INFLUENCE OF THE HABITUAL INCLINATION OF THE  
 PELVIS IN THE ERECT POSTURE UPON THE SHAPE  
 AND SIZE OF THE PELVIC CANAL.

BY BARTON COOKE HIRST, M.D.,  
Professor of Obstetrics in the University of Pennsylvania.







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FROM the last quarter of the eighteenth century, when Müller first called attention to it, the inclination of the pelvis received much attention from obstetricians, until the observations of Naegele, Weber, and Meyer showed how the pelvic obliquity varied greatly, not only in different postures, but even in the erect posture, under the influence of abduction, adduction, and rotation of the thighs. Thus, in a single individual, the pelvic obliquity, normally about  $45^{\circ}$ , can be practically obliterated in a squatting posture or can be increased to  $100^{\circ}$  by strong abduction and rotation of the thighs. Because the pelvic inclination can be decreased or increased at will, it is generally argued that the pelvic obliquity is a negligible quantity in the act of childbirth. While this view is correct, it has led to a general neglect to consider the influence of the habitual inclination of the pelvis in the erect posture upon the development of the pelvic bones and upon the evolution of the pelvic canal.

If there is an exaggerated inclination of the pelvis in childhood, as in rachitis, dislocation of the femora, double club-foot, lordosis, etc., the direction in which the trunk weight is received by the sacrum increases the rotation forward of that bone upon its transverse axis, diminishing the antero-posterior diameter of the inlet and diminishing the depth of the pelvic canal. Further, the exaggerated pull of the rotative muscles of the thigh, put constantly upon the stretch, separates the tuberosities of the ischia more widely than common, and thus widens the pelvic outlet.



On the other hand, if the pelvic inclination is much diminished, as in kyphosis from caries of the spine, rachitis, or certain forms of osteomalacia, the top of the sacrum is pushed backward, so that this bone is lengthened and straightened, thus making the antero-posterior diameter of the inlet greater and increasing the depth of the pelvic canal. Further, the pull of the ilio-psoas muscles, put upon the stretch in the erect posture, drags the iliac bones apart, and by a compensatory movement approximates the ischia, thus diminishing the transverse diameter of the pelvic outlet.

The habitual inclination of the pelvis in the erect posture is therefore one of the chief factors in the production of the most important pelvic contractions. Consequently its effect upon the progress of labor should not be ignored. These general propositions are well illustrated by the cases figured in the plate.

Figs. 1, 2, 3, and 4 represent a young woman, aged 19, whose spinal extensor muscles became paralyzed as the result of an attack of measles when she was about 13 years of age. The unopposed pull of the ilio-psoas muscles produced the extreme lordosis that may be seen in the illustrations. The pelvic inlet in this case looked actually downward and the pelvic outlet directly backward. The external measurements were: iliac spines, twenty-two and a half centimetres; iliac crests, twenty-six centimetres; external conjugate, fifteen and a half centimetres; tuberosities of the ischia, ten centimetres (a large measurement compared with the others). The extreme rotation of the pelvis on its transverse axis carried the external genitals with it so that they looked almost directly backward. Coitus in the usual posture would have been impossible. The upper edge of the pubic hair was more than five centimetres above the upper edge of the symphysis, the skin of the lower abdomen being unable to follow the pelvis in its backward movement. No position which this girl could assume would have much diminished the pelvic obliquity, so that, were she in labor, the process would be seriously retarded by the pelvic obliquity itself as well as by the influence of this obliquity upon the development of the pelvis.

Figs. 5, 6, and 7 represent an Italian woman, 25 years of age, who had had three children, all destroyed in labor. She had been in this country about seven years, and all her children had been born here; the first four and a half years ago. The osteomalacia, from which she suffered, had begun after the birth of the first child. In the last four years she has lost more than six inches in height, and now her trunk is so much shortened that the floating ribs are telescoped within the false pelvis. The spinal column has bent so far backward in the dorsal region that the same result is produced upon pelvic obliquity and, to a





FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



FIG. 5.

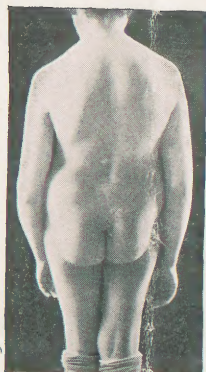


FIG. 6.

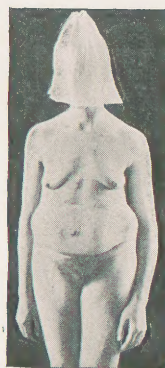


FIG. 7.



degree, upon pelvic form as though there had been a true kyphosis since childhood. The external pelvic measurements were as follows :

Iliac spines . . . . .	24½ cm.
Iliac crests . . . . .	27½ "
Trochanters . . . . .	29 "
External conjugate . . . . .	17½ "
Transverse of outlet . . . . .	9½ "
Ensiform cartilage to symphysis . . . . .	15½ "
Posterior superior spinous processes of ilia . . . . .	7 "

The upper edge of the symphysis was a considerable distance above the upper edge of the pubic hair. The anterior wall of the pelvis was sensitive, and the bones yielded to pressure.

The sacrum was twisted on its longitudinal diameter so that the right side of the bone was much more prominent than the left. On an internal examination, the pubic rami were so closely approximated that it was difficult to insert a finger between them. The sacral curve was exaggerated, as in rachitis, but the angulation was more pronounced.

The pelvis, in short, presented a queer combination of the rachitic and the kyphotic types.

I did an oöphorectomy on this patient in the hope of arresting the progress of her disease, but unfortunately she became wildly maniacal after the operation, tossed about in the most violent fashion, and at length pulled the stump on one side from its ligature and bled to death.

It has been repeatedly asserted that deformed pelves are rare in this country, but this assertion, as regards our larger cities, is refuted by my own experience and by that of every one who takes the trouble to observe the pelves in his pregnant and parturient patients.

During the past twelve months I have had under my care, in labor, two rachitic dwarfs, two women with obliquely contracted pelves, some half-dozen cases of rachitic pelvis and a larger number of generally contracted and of simple flat pelves.











